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(54) Title: METHOD FOR TREATING COFFEE AROMAS

(57) Abstract

A method for preparing an aromatized coffee or a coffee-flavored food comprising the steps of: (1) contacting a coffee aroma containg gas with a crystalline aluminosilicate of an alkali metal or an alkaline earth metal having a pore diameter of 3Å to 10Å; optionally (2) chilling the resulting treated coffee aroma containing gas with a scraped-wall heat exchanger cooled by means of a liquid gas refrigerant, thereby condensing said gas in the form of frost; (3) absorbing the resulting coffee aroma-containing gas or its frost into an absorbent selected from the group consisting of vegetable oils, coffee extracts, ethanol, propylene glycol and mixtures thereof, thereby recovering the coffee aroma, and adding the coffee aroma-containing absorbent to coffee or a coffee-flavored food is disclosed.

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DESCRIPTION

METHOD FOR TREATING COFFEE AROMAS

FIELD OF THE INVENTION:

The present invention relates to an improvement in the quality of soluble coffee or regular coffee. More particularly, the invention relates to improving the taste of soluble coffee or regular coffee by treating a coffee aroma containing gas evolved during the production of soluble coffee or regular coffee to selectively remove organoleptically undesirable volatile substances, and impart desirable coffee aromas recovered.

BACKGROUND OF THE INVENTION:

Roasted coffee contains volatile substances resulting from chemical reactions due to heating and which constitute the characteristic odor of the coffee. These volatile substances are generally called "aromas" herein this specification.

The term or symbols for "percent" as used herein refer to weight-weight percent unless otherwise indicated.

The term "coffee extract" as used herein means a liquid extract of roasted and ground coffee, or a dried product of the extract, obtained during the manufacture of soluble coffee or liquid coffee.

The term "a coffee-flavored food" as used herein means beverages such as milk, chewing gums, candy, or other foodstuffs which contain coffee extract or coffee aroma.

A method of improving the quality of soluble coffee by adding an aroma-absorbed coffee oil to coffee powder to enhance the odor of coffee is in customary use. Such a method is described, for example, in U.S. Patent Nos. 3,077,405 (1963) and 3,769,032 (1973).

Methods of producing coffee oil aimed at coffee aromatization include the following: A method described in U.S. Pat. No. 3,021,218 which chills aromas from a roasted coffee beans grinding step with liquid nitrogen to recover them as a frost. A method described in GB 1427949 which chills a coffee aroma containing gas with liquid nitrogen to recover it as a frost, the coffee aroma containing gas being evolved during a roasted coffee beans grinding step, or being evolved when hot water or steam is passed through a column packed with the freshest ground coffee beans during extraction in the production of soluble coffee. A method described in U.S. Pat. No. 4,556,575 which further places that frost in a pressure vessel, followed by heating and absorbing it to a glyceride, preferably coffee oil.

The above-described methods of recovering aromas from roasted coffee focus on obtaining higher concentrations of aromatic substances while minimizing the dissipation of coffee aromas. However, gases released during the grinding of roasted coffee beans particularly low-grade coffee beans in actual use contain relatively large quantities of aromatic component which present organoleptically undesirable odors. Aromatized oils prepared using them according to the aforementioned techniques have

a strongly irritating sulfureous odor quite different from the fragrance of roasted coffee.

This is because the aroma containing gases recovered by those methods contain a much higher level of pungent, foul-smelling volatile compounds like sulfur-containing compounds such as methylmercaptan and hydrogensulfide, and aldehydes. Although their contents in all aromatic components are as low as several percent or less, their organoleptic thresholds are much lower than those of the other aromatic components. When concentrated, those sulfur compounds etc. give off violently irritant odors. Thus, aromatized oils which the aroma containing gases have presented strongly irritating, sulfureous odors and the use for coffee containing foodstuffs has been minimally acceptable for consumers due to the low commercial value.

SUMMARY OF THE INVENTION:

It is therefore an object of this invention to provide a simple method capable of decreasing sulfur-containing compounds, etc., which give pungent, foul odors in aroma-containing gases.

In an attempt to achieve the above-mentioned object, we, the present inventors, have made studies, and found that when the coffee aroma-containing gas is contacted in a gaseous phase with a crystalline aluminosilicate of an alkali metal or an alkaline earth metal (hereinafter called zeolite) having a specific pore size, pungent volatile components are selectively adsorbed to the adsorbent, while desirable aromatic compounds are not adsorbed to the

adsorbent. The present invention is based on this finding.

This invention relates to a method for preparing an aromatized coffee or a coffee-flavored food, comprising the steps of:

contacting a coffee aroma-containing gas with zeolite having a pore diameter of 3Å to 10Å;

absorbing the treated coffee aroma-containing gas into an absorbent selected from the group consisting of vegetable oils, coffee extracts, ethanol, propylene glycol and mixtures thereof, thereby recovering the coffee aroma, and

adding the coffee aroma-containing absorbent to coffee or a coffee-flavored food.

This invention relates to a method for preparing an aromatized coffee or a coffee-flavored food, comprising the steps of:

contacting a coffee aroma-containing gas with zeolite having a pore diameter of 3Å to 10Å;

chilling the resulting treated coffee aroma containing gas with a scraped-wall heat exchanger cooled by means of a liquid gas refrigerant, preferably liquid nitrogen, to be condensed in the form of a frost;

absorbing the resulting frost into an absorbent selected from the group consisting of vegetable oils, coffee extracts, ethanol, propylene glycol and mixtures thereof, thereby recovering the coffee aroma, and

adding the coffee aroma-containing absorbent to coffee, for instance soluble coffee, or a coffee-flavored food.

DETAILED DESCRIPTION OF THE INVENTION:

Examples of the coffee-aroma-containing gases include an exhaust gas evolved during the roasting of green coffee beans, a coffee aroma containing gas evolved during the grinding of roasted coffee beans, and an aroma containing gas evolved by passing water of 80 - 100°C or steam at a pressure of 200 - 400 kPa through a column packed with the freshest ground coffee beans from an upper part or bottom of the column during extraction in the production of soluble coffee.

It is preferable that the coffee aroma-containing absorbent is sprayed onto soluble coffee powder before packaging in a jar or the absorbent is added into a jar with soluble coffee, or a coffee-flavored food.

The present invention can be accomplished by passing

1) a gas evolved during the roasting of coffee beans, or a gas evolved during the grinding of roasted coffee beans, or a coffee aroma containing gas evolved by passing hot water or steam through the freshest column packed with fresh ground coffee beans during extraction,

2) through a column packed with a molded product of molecular sieve zeolite, and

3) to adsorb volatile components of an irritant odor, such as hydrogensulfide, mercaptanes, and aldehydes exclusively onto the zeolite in a gaseous phase,

thereby decreasing their proportions of the irritant odors.

In selecting the adsorbent for use in the invention, it is critical that it have an effective pore diameter of 3 to 10Å, preferably a pore diameter of 4 to 5Å thereby creating a molecular sieve effect. The effective pore diameter referred to here is defined by the presence or absence of adsorption of a gas having a certain molecular diameter, for example, in the case of 5Å. That is, an adsorbent which adsorbs a 4.5Å gas but does not adsorb a 5.6Å gas is defined as having an effective pore diameter of 5Å.

In selecting the pore diameter, if the pore diameter is smaller than the size of the molecule to be adsorbed, this molecule cannot be trapped; if the pore diameter is larger, molecules other than the intended molecule are also trapped resulting in the disappearance of coffee fragrance itself. A further characteristic that the adsorbent should have is that it has a low adsorptivity for non-polar gaseous molecules such as nitrogen gas or carbon dioxide gas contained in large amounts in the aroma containing gas, and a high adsorptivity for polar molecules such as hydrogensulfide, mercaptans or aldehydes. Typical examples of adsorbents with such a characteristic are synthetic zeolites of namely UHP-A, or A-type, and X-type, namely UHP-X, having alkali metals such as sodium or calcium within crystals, and naturally occurring zeolites such as mordenite, shabacite or erionite. However, those with a

minimal silicon : aluminum mole ratio, specifically that of 10 or less, are preferred, since a high silicon : aluminum mole ratio eliminates the polar effect of the surfaces.

Examples of vegetable oils include coffee oil, coconut oil, palm oil, soybean oil, rapeseed oil and middle chain triglycerides (MCT).

In the commercial-scale practice of the invention, it is preferred for a continuous ventilation procedure to mix the zeolite with natural clay such as lignite, calcine the mixture to form it into spheres or pellets, and pack the column with spheres of 4 - 14 mesh or pellets of 1.5 - 3.0 mm in diameter. This will suppress pressure loss inside the column.

When such a zeolite is used for adsorption, it is necessary to prevent a decrease in the adsorptivity of the zeolite, because zeolite is apt to adsorb water, a polar molecule, and the aroma containing gas sometimes contains several percent of water. For this purpose, it is preferred to pass the aroma containing gas through a condenser preferably using propylene glycol of 0°C to 5°C for condensation and demoisturization, and then feed the aroma containing gas through the column.

Since corresponding adsorption heat occurs, it is preferred to lower the temperature of the gas to be fed by passing it through the above condenser or cooling with propylene glycol, or to cool the whole column with a coolant of a temperature lower than ordinary temperature, in order to raise the adsorbing efficiency. The linear velocity of

the feed gas within the column is desirably within the range of from 5 to 30 m/min.

From the aspect of cost, reuse of the zeolite is possible. The zeolite can be easily regenerated by contacting it for one or two hours with air or an inert gas heated to between 250° and 300°C, followed by cooling.

The degree of elimination of the intended irritant-odor components can be determined quantitatively by gas chromatography. The quantity of the gas treated which is to be recovered can be set depending on the intensity and desirability of organoleptic odors in the oil having adsorbed the aromas of the aroma containing gas treated.

<u>EXAMPLES</u>

The present invention will be described in detail by reference to Examples.

<u>Example 1</u>

A glass column with an internal diameter of 45 mm and a height of 190 mm was packed with 100 grams of A-type synthetic zeolite (ZEOLAM A5, Toso Kabushiki Kaisha, pore diameter of 5Å, spherical, 8 - 10 mesh). Grinder gas evolved during the grinding of fresh roasted coffee beans was passed through the packed column from its bottom at a flow rate of 5 liters/min. by means of a diaphragm type vacuum pump. The gas vented from the column was recovered into a 50-liter teddler bag, beginning immediately after gas passage. In an organoleptic test by a panel of experts, the gas was compared with the gas before being passed through the zeolite-packed column. The former gas was evaluated to

be significantly less in a sulfur-like irritant smell and to be an organoleptically desirable, gentle odor.

Example 2

A glass column with an internal diameter of 45 mm and a height of 190 mm was packed with 100 grams of A-type synthetic zeolite (ZEOLAM A5, Toso Kabushiki Kaisha, pore diameter of 5Å, spherical, 8 - 10 mesh). Grinder gas evolved during the grinding of fresh roasted coffee beans was passed through the zeolite-packed column at a flow rate of 5 liters/min. by means of a diaphragm type vacuum pump. The gas vented from the column was blown trough a 150 - 250 µm glass filter into 50 grams of coffee oil placed in a 250 ml scrubbing bottle. This procedure was performed continuously for 90 minutes from the beginning. The recovered oil was sprayed over freeze-dried coffee powder at a rate of 0.25%, and then 50 grams of the powder was sealed up in a 200 ml glass container. After the powder was allowed to stand at ordinary temperature, an organoleptic evaluation of its odor when the seal of the glass container was opened for the first time was made by a panel of experts. A sample prepared likewise, however without passage through the zeolite-packed column, was found to have an irritant smell resembling sulfur. A sample prepared by the method of the present invention was found to be significantly less in a sulfur-like irritant smell and to have an organoleptically desirable, gentle odor.

Example 3

A stainless column with an internal diameter of 16.5 mm and a height of 1,000 mm was packed with 100 grams of A-type synthetic zeolite (ZEOLAM A4, Toso Kabushiki Kaisha, pore diameter of 4Å, spherical, 8 - 10 mesh). An aroma-containing gas was evolved from 250 kgs of ground roasted coffee by moistening the coffee from its above using hot water or steam of 90°C under reduced pressure. The resulting gas was passed for 15 minutes through a propylene glycol-cooled condenser of 5°C by means of a diaphragm type vacuum pump. A total of 956 grams of water contained in the gas was removed by passing the moisture-containing aroma through the condenser. The demoisturized aroma-containing gas was passed through the condenser. The gas vented from the column was recovered into an oil in the same manner as in Example 2. For a control, an aromatized oil was prepared in the same manner, however, without passage through a zeolite-packed column.

1.0 gram of each aromatized oil was placed in a 20 ml sample vial and sealed. After 30 minutes equilibration at 40°C, 100 µl were taken from the headspace vial by means of a gas-tight syringe. Gas chromatographic separations of the headspace sample were carried out according to a methodology described by reference [1]. Values given in Table 1 are calculated as percentages of the gas chromatographically recorded peak areas relative to the total peak area according to the following formula:

Peak area (%) =

$$\frac{\textit{Peak area of component X 100}}{\text{Sum } \textit{of all peak areas recorded by an integrator}}$$

Hydrogensulfide was determined after a similar sample preparation as mentioned above but via mass selective detection using the specific mass m/z 34 and the same chromatographic conditions described in Holscher, W.; Vitzthum, O.G.; Steinhart, H.; Identification and sensorial evaluation of aroma-impact-compounds in roasted Colombian coffee. Café, Cacao, Thé 34, 205-212, 1990 Reference [2].

A chemical composition of light volatile aromas released from freshly roasted and ground coffees has been a wide field of investigation in the past. Holscher W., Steinhart H.; Investigation of Roasted Coffee Freshness with an Improved Headspace Technique. Z. Lebensm. Unters. Forsch. 195, 33-38, 1992. (Reference [1]) This documents sets forth a systematic investigation of the aroma composition of the headspace above roasted and ground coffees by means of combined gas chromatography and olfactometry. During organoleptic evaluation about sixteen (16) odor notes could be perceived. The number of aroma notes detected in the headspace of roasted and ground coffees was therefore low compared with a total aroma extract isolated by a steam distillation when over sixty (60) odor notes were detectable as described in Reference [2]. Consecutively, the organoleptic impression released from freshly roasted and ground coffees only consists of

a certain subfraction of the total aroma content, namely low-boiling and low molecular sulfur compounds (dimethylsulfide and methanethiol), furthermore, Strecker aldehydes (acetaldehyde, 2-methylpropanal, 3-methylpropanal or 2-methylbutanal) and α-dicarbonyls (diacetyl, 2,3-pentanedione). The applied headspace methodology is well established in the literature and allows the aroma assessment of coffee oils. This methodology covers nearly all aromas relevant light volatiles of interest, thereby a high degree of sensory correlation is guaranteed. The precision of the method is quite good even without using an internal standard. Standard deviations are typically in a range of 3% in case of 3-methylbutanal and maximum 7% for dimethylsulfide as described in Reference [1].

The gas chromatographic-olfactometric investigations described in Reference [1] reveal that the major contributors to putrid sulfureous nuances in grinder gas type aroma are methylmercaptane and especially hydrogensulfide. Pungent aroma notes are formed mainly by low chain Strecker-aldehydes, one of the most pungent ones is acetaldehyde. Therefore, hydrogensulfide, methylmercaptane, and acetaldehyde were chosen as key indicator compounds to demonstrate the upgrading potential of this invention. As mentioned earlier, the sensory relevance of these compounds is well established in scientific coffee literature. Methylmercaptane and acetaldehyde as well as further light volatile aromatics are easily measurable with the applied headspace technique.

On the other hand, hydrogensulfide can be smelled as a single note at the outlet of a sniffing port but it does not give an adequate signal by flame ionization detection. Therefore, the quantification was carried out via mass spectrometry that provides the highest degree of selectivity.

As indicated in Table 1, it is obvious that hydrogensulfide is reduced substantially in the zeolite 4Å treated oil compared to the control oil. Furthermore, it can be concluded from the data in Table 1 that the zeolite 4Å treated oil contains substantially lower percentages of the pungent note acetaldehyde and slightly lower percentages of the putrid, sulfureous smelling methylmercaptane. On the other hand, the shares of dimethylsulfide are somewhat higher in the zeolite 4Å treated oil. This is rated as positive because dimethyl-sulfide exhibits a weak coffee-like aroma impression. It is important to note that further major contributors to headspace in-jar aroma such as 2-methylpropanal, diacetyl, 3-methylpropanal, 2-methylbutanal, and 2,3-pentanedione remain more or less unchanged in particular when the data of the control oil and the zeolite 4Å treated oil are compared to each other.

Table 1

Headspace Measurements of Aromatized Oil

Compound	Control Oil	Zeolite 4Å Treated Oil	Odor Description
Hydrogensulfide 1)	61024	27500	putrid, foul
Acetaldehyde	12.3	5.9	pungent, fruity
Methylmercaptane	0.7	0.5	putrid, sulfureous
Dimethylsulfide	1.1	3.3	sweet,coffee-like
2-Methylpropanal	10.5	11.1	pungent, malty
Diacetyl	3.5	3.9	buttery
3-Methylbutanal	5.2	5.8	sweaty, pungent
2-Methylbutanal	6.2	6.8	fermented, sweaty
2,3-Pentanedione	0.8	1.1	buttery

1) Absolute Peak Area Counts of m/z 34

Example 4

The aromatized oils obtained in the same manner as in Example 3 were diluted with three times as much as of coffee oil, and sprayed over freeze-dried coffee powder at a rate of 0.20%, whereafter sprayed coffee powder was sealed up in a glass container. Its organoleptic evaluation when the glass container was opened was made by a panel of 6 experts. The results of this test are shown in the following table.

Table 2

Organoleptic Evaluations by Panel of Experts

	Range	Control product	Zeolite 4Å treated product	Zeolite 10Å treated product
Intensity of odor	1-9	7.0	6.5	6.0
Freshness of odor	1-9	8.1	8.2	8.0
R&G-like properties	1-9	8.0	8.5	7.8
Irritant odor	1-9	8.5	5.0	4.0
Sulfureous odor	0-9	2.5	0.5	not detected

Notes: The values represent the grade of each characteristic of odor (0: none, 1: weak/low, 9: strong/high), expressed as an average of evaluations made by the panel.

The above results show that the present invention was able to enhance the character of roasted and ground coffee (R&G) and reduce an irritant odor resembling sulfur.

Example 5

An aroma-containing gas was treated in the same way as in Examples 3 and 4 using 100 grams of X type synthetic zeolite (ZEOLAM F9, Toso Kabushiki Kaisha, pore diameter of 10Å, spherical, 8 - 10 mesh). The resulting aromatized oil was sprayed over freeze-dried coffee powder, and the sprayed coffee powder was sealed up in a glass container. A greater decrease in aromatic components than in Example 3 was observed, and the resulting product was organoleptically found to be less irritant and gentler in odor.

Example 6

An aroma-containing gas was treated in the same way as in Example 4 using 100 grams of naturally occurring zeolite (MORDENITE, effective pore diameter of 7Å, pellet with 3.0 mm diameter and 8 mm length). The resulting aromatized oil was sprayed over freeze-dried coffee powder, and the sprayed coffee powder was sealed up in a glass container. An irritant odor resembling sulfur was recognized to be decreased to a similar degree compared to that noted in Example 4 by a panel of experts and the odor was evaluated to be organoleptically desirable and gentle.

Example 7

A glass column with an internal diameter of 16.5 mm and height of 1,000 mm was packed with 100 g of A type synthetic zeolite (ZEOLAM A5, Toso Kabushiki Kaisha, pore diameter of 5Å, spherical, 8 - 10 mesh). A demoisturized aroma-containing gas passed through the column from its bottom at a flow rate of 5 liters/min in the same way as in Example 3. The gas vented from a top of the column was directly was blown through a 150 - 250 μm glass fiber into 5.0 kgs of coffee extract that contained 35% solid and cooled at a water jacket temperature of 4°C for 2 hours. In an organoleptic test by a panel of experts, a coffee extract diluted with boiled water to be in a concentration of 1.2% was compared to one prepared as a control in the same manner but the glass column was not packed with zeolite. Putrid and harsh flavor, recognized in the

control, were not observed in the coffee extract treated according to the process as taught by the invention. Coffee experts clearly preferred an organoleptically desirable, gentle odor in the zeolite-treated, aroma-containing, coffee extract.

Comparative Example

An aroma-containing gas was treated in the same way as in Example 4 using 100 grams of synthetic zeolite (MOLECULAR SIEVE 13X, Nakarai Tesk Kabushiki Kaisha, pore diameter of 11Å, spherical, 8 - 10 mesh). The resulting aromatized oil was sprayed over freeze-dried coffee powder, and the sprayed coffee powder was sealed up in a glass container. In this case, 57% of the aromatic components present in the pretreated aroma-containing gas were adsorbed. Organoleptic evaluation at opening of the glass container showed a greater decrease in aromatic components than in Example 3. Organoleptically, the coffee powder had no coffee-like odor any more.

CLAIMS

1. A method for preparing an aromatized coffee or a coffee-flavored food, comprising the steps of:

contacting a coffee aroma-containing gas with a crystalline aluminosilicate of an alkali metal or an alkaline earth metal having a pore diameter of 3Å to 10Å;

absorbing the treated coffee aroma-containing gas into an absorbent selected from the group consisting of vegetable oils, coffee extracts, ethanol, propylene glycol and mixtures thereof, thereby recovering the coffee aroma, and

adding the coffee aroma-containing absorbent to coffee or a coffee-flavored food.

2. The method of Claim 1, wherein said absorbent comprises a vegetable oil.

3. The method of Claim 2, wherein said vegetable oil is a coffee oil.

4. The method of claim 1, wherein said coffee aroma-containing absorbent is sprayed on said coffee or said coffee-flavored food.

5. The method of Claim 1, wherein said coffee aroma containing gas is a gas evolved during the roasting of coffee beans, or a gas evolved during the grinding of roasted coffee beans, or a gas evolved during the extraction of ground roasted coffee.

6. A method for preparing an aromatized coffee or a coffee-flavored food comprising the steps of:

contacting a coffee aroma-containing gas with a crystalline aluminosilicate of an alkali metal or an alkaline earth metal having a pore diameter of 3Å to 10Å;

chilling the resulting treated coffee aroma containing gas with a scraped-wall heat exchanger cooled by means of a liquid gas refrigerant, thereby condensing said gas in the form of frost;

absorbing the resulting frost into an absorbent selected from the group consisting of vegetable oils, coffee extracts, ethanol, propylene glycol and mixtures thereof, thereby recovering the coffee aroma, and

adding the coffee aroma-containing absorbent to coffee or a coffee-flavored food.

7. The method of Claim 6, wherein said liquid gas refrigerant is a liquid nitrogen.

8. The method of Claim 7, wherein said absorbent comprises a vegetable oil.

9. The method of Claim 8, wherein said vegetable oil is a coffee oil.

10. The method of Claim 7, wherein said coffee aroma-containing absorbent is sprayed on said coffee or said coffee-flavored food.

11. A method for treating a coffee aroma characterized by contacting said coffee aroma-containing gas with a crystalline aluminosilicate of an alkali metal or an alkaline earth metal having a pore diameter of 3Å to 10Å.

12. A coffee aroma containing gas produced by the process of Claim 11.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 94/01820

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23F5/48 A23F5/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A23F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR,A,1 255 314 (UNION CARBIDE CO) 30 January 1961 see page 2, column 1 - column 2; example 3 ---	11,12
X	NL,A,8 701 546 (DOUWE EGBERTS) 1 February 1989 see page 3, paragraph 5 - page 4, paragraph 1; claims 1,4-6; table B ---	11,12
A	US,A,2 875 063 (J. FELDMAN) 24 February 1959 see column 2, line 13 - line 63; claims 1-4 see column 3, line 37 - column 4, line 47 ---	1,5-7,10
A	FR,A,2 271 774 (GENERAL FOODS CO) 19 December 1975 see claims 1-14; examples VI,VII --- -/--	7-10

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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1

Date of the actual completion of the international search	Date of mailing of the international search report
20 January 1995	31. 01. 95

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR,A,2 331 965 (SOC. DES PRODUITS NESTLÉ) 17 June 1977 see claims 1,11-13; example 1 ---	1-5
A	EP,A,0 474 005 (JACOBS SUCHARD) 11 March 1992 see claims 1-3 ---	1,11
A	EP,A,0 013 451 (UNION CARBIDE CO) 23 July 1980 ---	
A	EP,A,0 489 401 (JACOBS SUCHARD) 10 June 1992 see page 8, line 27 - line 54; claim 1 -----	11

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte onal Application No
PCT/JP 94/01820

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-1255314		NONE	
NL-A-8701546	01-02-89	NONE	
US-A-2875063	24-02-59	NONE	
FR-A-2271774	19-12-75	US-A- 3979528	07-09-76
		US-A- 4007291	08-02-77
		US-A- 3939291	17-02-76
		AU-A- 8029875	21-10-76
		CA-A- 1043155	28-11-78
		CH-A- 602020	14-07-78
		DE-A,C 2521318	04-12-75
		GB-A- 1499756	01-02-78
		JP-C- 1286809	31-10-85
		JP-A- 50157565	19-12-75
		JP-B- 60010690	19-03-85
		NL-A- 7505538	24-11-75
		SE-B- 424803	16-08-82
		SE-A- 7505549	21-11-75
		BE-A- 829038	14-11-75
		CA-A- 1043154	28-11-78
		CA-A- 1042706	21-11-78
		CA-A- 1043153	28-11-78
FR-A-2331965	17-06-77	US-A- 4072761	07-02-78
		AU-B- 497377	07-12-78
		AU-A- 1995676	01-06-78
		CA-A- 1068975	31-12-79
		CH-A- 616315	31-03-80
		DE-A,C 2653436	26-05-77
		GB-A- 1525808	20-09-78
		JP-C- 1266346	27-05-85
		JP-A- 52066668	02-06-77
		JP-B- 59041693	09-10-84
		NL-A- 7613091	26-05-77
EP-A-0474005	11-03-92	DE-A- 4028415	12-03-92
		AT-T- 108616	15-08-94
		AU-B- 639823	05-08-93

Form PCT/ISA/210 (patent family annex) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/JP 94/01820

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0474005		AU-A- 8350091	12-03-92
		CA-A- 2050695	08-03-92
		CN-A- 1059834	01-04-92
		DE-D- 69102956	25-08-94
		DE-T- 69102956	19-01-95
		ES-T- 2059002	01-11-94
		JP-A- 4229140	18-08-92
		US-A- 5229155	20-07-93
EP-A-0013451	23-07-80	CA-A- 1141229	15-02-83
		JP-A- 55088806	04-07-80
		JP-B- 60034404	08-08-85
		US-A- 4331694	25-05-82
EP-A-0489401	10-06-92	DE-A- 4038526	04-06-92
		AU-B- 643092	04-11-93
		AU-A- 8834691	04-06-92
		CA-A- 2056257	04-06-92
		CN-A- 1064195	09-09-92
		JP-A- 4267846	24-09-92
		JP-A- 4287638	13-10-92
		NZ-A- 240810	23-12-93
		US-A- 5225223	06-07-93